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<110> NORRIS, STEVEN J.

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<141> 2005-06-17

<150> PCT/US2003/04118
<151> 2003-12-22

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Phe Phe Val Phe Ile Asn Cys Lys Ser Gln Val Ala Asp Lys Asp Asp
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cca aca aac aaa ttt tac caa tct gtc ata caa tta ggt aac gga ttt 206
Pro Thr Asn Lys Phe Tyr Gln Ser Val Ile Gln Leu Gly Asn Gly Phe
30 35 40

ctt gat gta ttc aca tct ttt ggt ggg tta gta gca gag gct ttt gga 254
Leu Asp Val Phe Thr Ser Phe Gly Gly Leu Val Ala Glu Ala Phe Gly
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Phe Lys Ser Asp Pro Lys Lys Ser Asp Val Lys Thr Tyr Phe Thr Thr
65 70 75

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Gly Ser Val Gly Thr Ala Val Glu Gly Ala Ile Lys Glu Val Ser Glu
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125                 130                 135                 140

agt ggt act gct gca att gga gaa gtt gtg gct gat gct gat gct gca   542
Ser Gly Thr Ala Ala Ile Gly Glu Val Val Ala Asp Ala Asp Ala Ala
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aag gtt gct gat aag gcg agt gtg aag ggg att gct aag ggg ata aag   590
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gag att gtt gaa gct gct ggg ggg agt gaa aag ctg aaa gct gtt gct   638
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acg gct gct gat gcg gct gag cag gat gga aag aag cct gag gag gct   830
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aaa aat ccg att gct gct gct att ggg gat aaa gat ggg ggt gcg gag   878
Lys Asn Pro Ile Ala Ala Ala Ile Gly Asp Lys Asp Gly Gly Ala Glu
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Ala Leu Arg Gly Met Ala Lys Asp Gly Lys Phe Ala Val Lys Asp Gly
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gag aaa gag aag gct gag ggg gct att aag gga gct gct gag tct gca   1022
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gtt cgc aaa gtt tta ggg gct att act ggg cta ata gga gac gcc gtg   1070
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Ser Ser Gly Leu Arg Lys Val Gly Asp Ser Val Lys Ala Ala Ser Lys
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gaa aca cct cct gcc ttg aat aag tgatttaatt aagtgtatgg acacgactat  1172
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Pro Lys Lys Ser Asp Val Lys Thr Tyr Phe Thr Thr Val Ala Ala Lys
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Leu Glu Lys Thr Lys Thr Asp Leu Asn Ser Leu Pro Lys Glu Lys Ser
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Asp Ile Ser Ser Thr Thr Gly Lys Pro Asp Ser Thr Gly Ser Val Gly
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Thr Ala Val Glu Gly Ala Ile Lys Glu Val Ser Glu Leu Leu Asp Lys
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Lys Ala Ser Val Lys Gly Ile Ala Lys Gly Ile Lys Glu Ile Val Glu
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Glu Asn Asn Lys Gly Ala Gly Lys Leu Phe Gly Lys Ala Gly Ala Ala
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Ala Ala Glu Gln Asp Gly Lys Lys Pro Glu Glu Ala Lys Asn Pro Ile
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Ala Ala Ala Ile Gly Asp Lys Asp Gly Gly Ala Glu Phe Gly Gln Asp
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Glu Met Lys Lys Asp Asp Gln Ile Ala Ala Ala Ile Ala Leu Arg Gly
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Met Ala Lys Asp Gly Lys Phe Ala Val Lys Asp Gly Glu Lys Glu Lys
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305                 310                 315                 320

Leu Gly Ala Ile Thr Gly Leu Ile Gly Asp Ala Val Ser Ser Gly Leu
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tta aca tct ata gct aat tta ggg aaa gga ttt tta gat gtt ttt gtg   144
Leu Thr Ser Ile Ala Asn Leu Gly Lys Gly Phe Leu Asp Val Phe Val
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act ttt gga gat atg gtt act gga gct ttt ggt att aag gca gat act   192
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aca tca gtt aaa aag aag ttg caa gat gaa gtt gct aag aat ggt aac   288
Thr Ser Val Lys Lys Lys Leu Gln Asp Glu Val Ala Lys Asn Gly Asn
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tat cca aag gta aag aca gct gtt gac gaa ttt gtt gca atc tta gga   336
Tyr Pro Lys Val Lys Thr Ala Val Asp Glu Phe Val Ala Ile Leu Gly
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aag atc gag aaa gga gca aaa gaa gca tct aaa ggg gct act ggt gat   384
Lys Ile Glu Lys Gly Ala Lys Glu Ala Ser Lys Gly Ala Thr Gly Asp
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gtt att att ggg aat act gtt aag aat ggt gat gct gta cct gga gaa   432
Val Ile Ile Gly Asn Thr Val Lys Asn Gly Asp Ala Val Pro Gly Glu
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gca aca agt gtc aat tct ctt gtt aaa gga att aaa gaa ata gtt ggg   480
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gta gtc ttg aag gaa ggt aag gca gat gct gat gct act aaa gat gat   528
Val Val Leu Lys Glu Gly Lys Ala Asp Ala Asp Ala Thr Lys Asp Asp
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agt aag aaa gat att ggt aaa tta ttt acc gca acc act gat gcg aat   576
Ser Lys Lys Asp Ile Gly Lys Leu Phe Thr Ala Thr Thr Asp Ala Asn
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aga gct gat aat gcg gca gct caa gca gct gca gcg tca ata gga gca   624
Arg Ala Asp Asn Ala Ala Ala Gln Ala Ala Ala Ala Ser Ile Gly Ala
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gtg aca ggt gct gat atc ttg caa gct ata gta caa tct aag gaa aat   672
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cct gtt gca aat agt act gat gga att gaa aaa gca aca gat gca gct   720
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gag att gca gtt gct cca gct aaa gat aat aaa aaa gag att aaa gat   768
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gga gca aaa aaa gac gca gtt att gct gca ggc att gca ctg cga gca   816
Gly Ala Lys Lys Asp Ala Val Ile Ala Ala Gly Ile Ala Leu Arg Ala
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gta acg acg ata aat agt gca gca gca agc gca gtg aac aag att tta   912
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agc act cta ata ata gca ata agg aat aca gtt gat agt ggt tta aaa   960
Ser Thr Leu Ile Ile Ala Ile Arg Asn Thr Val Asp Ser Gly Leu Lys
305                 310                 315                 320

aca ata aat gag gct ctt gct aca gtt aaa caa gaa gat aaa tct gta   1008
Thr Ile Asn Glu Ala Leu Ala Thr Val Lys Gln Glu Asp Lys Ser Val
                325                 330                 335

gaa gca act aat act gca gaa gca aca act agt ggt cag caa gcg aaa   1056
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            340                 345                 350

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     50                  55                  60
Lys Lys Ser Asp Ile Gly Lys Tyr Phe Thr Asp Ile Glu Ser Thr Met
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Thr Ser Val Lys Lys Lys Leu Gln Asp Glu Val Ala Lys Asn Gly Asn
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Tyr Pro Lys Val Lys Thr Ala Val Asp Glu Phe Val Ala Ile Leu Gly
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Lys Ile Glu Lys Gly Ala Lys Glu Ala Ser Lys Gly Ala Thr Gly Asp
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Val Ile Ile Gly Asn Thr Val Lys Asn Gly Asp Ala Val Pro Gly Glu
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Ala Thr Ser Val Asn Ser Leu Val Lys Gly Ile Lys Glu Ile Val Gly
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Val Val Leu Lys Glu Gly Lys Ala Asp Ala Asp Ala Thr Lys Asp Asp
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Ser Lys Lys Asp Ile Gly Lys Leu Phe Thr Ala Thr Thr Asp Ala Asn
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Gly Ala Lys Lys Asp Ala Val Ile Ala Ala Gly Ile Ala Leu Arg Ala
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Met Ala Lys Asn Gly Thr Phe Ser Ile Lys Asn Asn Glu Asp Ala Ala
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Val Thr Thr Ile Asn Ser Ala Ala Ala Ser Ala Val Asn Lys Ile Leu
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gtgaa atg gaa aaa ata gaa aaa ttt aaa aac aaa tgt caa cat aaa cta 8270
      Met Glu Lys Ile Glu Lys Phe Lys Asn Lys Cys Gln His Lys Leu
        1               5                  10                  15

caa cat aaa cta atc gta tta gta tca aca ctt tgc tat ata aac aat   8318
Gln His Lys Leu Ile Val Leu Val Ser Thr Leu Cys Tyr Ile Asn Asn
                20                  25                  30

aaa aat aaa aaa tat tca caa agc aac atc ctt tat tat ttt aat gaa   8366
Lys Asn Lys Lys Tyr Ser Gln Ser Asn Ile Leu Tyr Tyr Phe Asn Glu
            35                  40                  45

aat tta aaa aga aat ggg caa acc cct att aaa ata aaa aca tta caa   8414
Asn Leu Lys Arg Asn Gly Gln Thr Pro Ile Lys Ile Lys Thr Leu Gln
        50                  55                  60

aac tat ctt tat aaa ctg gaa aaa gaa ttt gaa gta aca act aat tat   8462
Asn Tyr Leu Tyr Lys Leu Glu Lys Glu Phe Glu Val Thr Thr Asn Tyr
    65                  70                  75

tat aaa cac ttg ggg gtt aat tgt gga acc gaa att tac tat aaa ctt   8510
Tyr Lys His Leu Gly Val Asn Cys Gly Thr Glu Ile Tyr Tyr Lys Leu
80                  85                  90                  95

aaa tat caa aaa caa aaa tgc tat cat aaa ata aac caa tat ttt aaa   8558
Lys Tyr Gln Lys Gln Lys Cys Tyr His Lys Ile Asn Gln Tyr Phe Lys
                100                 105                 110

aag aaa aaa gaa att aaa ttt aac tta aga gta agt gca ttt ttt aat   8606
Lys Lys Lys Glu Ile Lys Phe Asn Leu Arg Val Ser Ala Phe Phe Asn
            115                 120                 125

aaa aaa cac tca aaa aaa ggg agt gta gaa tta aag gaa tgt aat aat   8654
Lys Lys His Ser Lys Lys Gly Ser Val Glu Leu Lys Glu Cys Asn Asn
        130                 135                 140

aat aat aat aat aaa gag aaa gaa aca tcc caa aaa att gaa att tta   8702
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Asn Asn Asn Asn Lys Glu Lys Glu Thr Ser Gln Lys Ile Glu Ile Leu
    145                 150                 155

caa aca aaa gtc tat gcc aaa aaa tgt aaa ttt ttg aca aac tac tat   8750
Gln Thr Lys Val Tyr Ala Lys Lys Cys Lys Phe Leu Thr Asn Tyr Tyr
160                 165                 170                 175

act aaa att tta                                                  8762
Thr Lys Ile Leu
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<210> 6
<211> 179
<212> PRT
<213> Borrelia afzelii

<400> 6

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Met Glu Lys Ile Glu Lys Phe Lys Asn Lys Cys Gln His Lys Leu Gln
  1               5                  10                  15

His Lys Leu Ile Val Leu Val Ser Thr Leu Cys Tyr Ile Asn Asn Lys
             20                  25                  30

Asn Lys Lys Tyr Ser Gln Ser Asn Ile Leu Tyr Tyr Phe Asn Glu Asn
         35                  40                  45

Leu Lys Arg Asn Gly Gln Thr Pro Ile Lys Ile Lys Thr Leu Gln Asn
     50                  55                  60

Tyr Leu Tyr Lys Leu Glu Lys Glu Phe Glu Val Thr Thr Asn Tyr Tyr
 65                  70                  75                  80

Lys His Leu Gly Val Asn Cys Gly Thr Glu Ile Tyr Tyr Lys Leu Lys
                 85                  90                  95

Tyr Gln Lys Gln Lys Cys Tyr His Lys Ile Asn Gln Tyr Phe Lys Lys
            100                 105                 110

Lys Lys Glu Ile Lys Phe Asn Leu Arg Val Ser Ala Phe Phe Asn Lys
        115                 120                 125

Lys His Ser Lys Lys Gly Ser Val Glu Leu Lys Glu Cys Asn Asn Asn
    130                 135                 140

Asn Asn Asn Lys Glu Lys Glu Thr Ser Gln Lys Ile Glu Ile Leu Gln
145                 150                 155                 160

Thr Lys Val Tyr Ala Lys Lys Cys Lys Phe Leu Thr Asn Tyr Tyr Thr
                165                 170                 175

Lys Ile Leu
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<210> 7
<211> 416

<212> DNA
<213> Borrelia afzelii

<220>
<221> CDS
<222> (1)..(414)

<400> 7
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aag ggg att gcg aag ggg ata aag ggg att gtt gcg gct gct ggg aag   48
Lys Gly Ile Ala Lys Gly Ile Lys Gly Ile Val Ala Ala Ala Gly Lys
  1               5                  10                  15

gct ttt ggc aag gat ggt gat gcg ctg aca ggt gtt gca aaa gct gct   96
Ala Phe Gly Lys Asp Gly Asp Ala Leu Thr Gly Val Ala Lys Ala Ala
             20                  25                  30

gag aat gat gct aac aag gat gcg ggg aag ttg ttt gct ggt aag aat   144
Glu Asn Asp Ala Asn Lys Asp Ala Gly Lys Leu Phe Ala Gly Lys Asn
         35                  40                  45

ggt aat gct ggt gct gct gac att gcg aag gcg gct gct gct gtt act   192
Gly Asn Ala Gly Ala Ala Asp Ile Ala Lys Ala Ala Ala Ala Val Thr
     50                  55                  60

gcg gtt agt ggg gag cag ata cta aaa gct att gtt gag gcg gct ggt   240
Ala Val Ser Gly Glu Gln Ile Leu Lys Ala Ile Val Glu Ala Ala Gly
 65                  70                  75                  80

gat gcg gat cag gcg ggt gta aag gct gat gcg gct aag aat ccg att   288
Asp Ala Asp Gln Ala Gly Val Lys Ala Asp Ala Ala Lys Asn Pro Ile
                 85                  90                  95

gca gct gcg att ggg act gct gat gat ggt gct gcg ttt ggt aag gat   336
Ala Ala Ala Ile Gly Thr Ala Asp Asp Gly Ala Ala Phe Gly Lys Asp
            100                 105                 110

gag atg aag aag aga aat gat aag att gtt gca gct att gtt ttg agg   384
Glu Met Lys Lys Arg Asn Asp Lys Ile Val Ala Ala Ile Val Leu Arg
        115                 120                 125

ggg gtg cct aag gat gga aag ttt gct gct aa                       416
Gly Val Pro Lys Asp Gly Lys Phe Ala Ala
    130                 135
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<210> 8
<211> 138
<212> PRT
<213> Borrelia afzelii

<400> 8
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Lys Gly Ile Ala Lys Gly Ile Lys Gly Ile Val Ala Ala Ala Gly Lys
  1               5                  10                  15

Ala Phe Gly Lys Asp Gly Asp Ala Leu Thr Gly Val Ala Lys Ala Ala
             20                  25                  30
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Glu Asn Asp Ala Asn Lys Asp Ala Gly Lys Leu Phe Ala Gly Lys Asn
         35                  40                  45

Gly Asn Ala Gly Ala Ala Asp Ile Ala Lys Ala Ala Ala Ala Val Thr
     50                  55                  60

Ala Val Ser Gly Glu Gln Ile Leu Lys Ala Ile Val Glu Ala Ala Gly
 65                  70                  75                  80

Asp Ala Asp Gln Ala Gly Val Lys Ala Asp Ala Ala Lys Asn Pro Ile
                 85                  90                  95

Ala Ala Ala Ile Gly Thr Ala Asp Asp Gly Ala Ala Phe Gly Lys Asp
            100                 105                 110

Glu Met Lys Lys Arg Asn Asp Lys Ile Val Ala Ala Ile Val Leu Arg
        115                 120                 125

Gly Val Pro Lys Asp Gly Lys Phe Ala Ala
    130                 135
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<210> 9
<211> 413
<212> DNA
<213> Borrelia afzelii

<220>
<221> CDS
<222> (1)..(411)

<400> 9

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aag ggg att gcg aag ggg ata aag ggg att gtt gat gct gct ggg aag   48
Lys Gly Ile Ala Lys Gly Ile Lys Gly Ile Val Asp Ala Ala Gly Lys
  1               5                  10                  15

gct ttt ggc aag gag ggt agt gcg ctg aag gat gtt gca aaa gtt gct   96
Ala Phe Gly Lys Glu Gly Ser Ala Leu Lys Asp Val Ala Lys Val Ala
             20                  25                  30

gat gat gat aac aag gat gcg ggg aag ttg ttt gct ggt aag aat ggt   144
Asp Asp Asp Asn Lys Asp Ala Gly Lys Leu Phe Ala Gly Lys Asn Gly
         35                  40                  45

ggt gct ggt gct gct gat gcg att ggg aag gcg gct gct gct gtt act   192
Gly Ala Gly Ala Ala Asp Ala Ile Gly Lys Ala Ala Ala Ala Val Thr
     50                  55                  60

gcg gtt agt ggg gag cag ata ctg aaa gct att gtt gat gct gct ggt   240
Ala Val Ser Gly Glu Gln Ile Leu Lys Ala Ile Val Asp Ala Ala Gly
 65                  70                  75                  80

gct gca gct aat cag gcg ggt aaa aag gct gcg gat gct aag aat ccg   288
Ala Ala Ala Asn Gln Ala Gly Lys Lys Ala Ala Asp Ala Lys Asn Pro
                 85                  90                  95
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att gcg gct gcg att ggg act gct gat gat ggg gcg gag ttt aag gat   336
Ile Ala Ala Ala Ile Gly Thr Ala Asp Asp Gly Ala Glu Phe Lys Asp
            100                 105                 110

gat atg aag aag agt gat aat att gct gcg gct att gtt ttg agg ggg   384
Asp Met Lys Lys Ser Asp Asn Ile Ala Ala Ala Ile Val Leu Arg Gly
        115                 120                 125

gtg cct aag gat gga aag ttt gct gct aa                            413
Val Pro Lys Asp Gly Lys Phe Ala Ala
    130                 135
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<210> 10
<211> 137
<212> PRT
<213> Borrelia afzelii

<400> 10

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Lys Gly Ile Ala Lys Gly Ile Lys Gly Ile Val Asp Ala Ala Gly Lys
  1               5                  10                  15

Ala Phe Gly Lys Glu Gly Ser Ala Leu Lys Asp Val Ala Lys Val Ala
             20                  25                  30

Asp Asp Asp Asn Lys Asp Ala Gly Lys Leu Phe Ala Gly Lys Asn Gly
         35                  40                  45

Gly Ala Gly Ala Ala Asp Ala Ile Gly Lys Ala Ala Ala Ala Val Thr
     50                  55                  60

Ala Val Ser Gly Glu Gln Ile Leu Lys Ala Ile Val Asp Ala Ala Gly
 65                  70                  75                  80

Ala Ala Ala Asn Gln Ala Gly Lys Lys Ala Ala Asp Ala Lys Asn Pro
                85                  90                  95

Ile Ala Ala Ala Ile Gly Thr Ala Asp Asp Gly Ala Glu Phe Lys Asp
            100                 105                 110

Asp Met Lys Lys Ser Asp Asn Ile Ala Ala Ala Ile Val Leu Arg Gly
        115                 120                 125

Val Pro Lys Asp Gly Lys Phe Ala Ala
    130                 135
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<210> 11
<211> 428
<212> DNA
<213> Borrelia afzelii

<220>
<221> CDS
<222> (1)..(426)

<400> 11
aag ggg att gcg aag ggg ata aag ggg att gtt gat gct gct ggg aag 48
Lys Gly Ile Ala Lys Gly Ile Lys Gly Ile Val Asp Ala Ala Gly Lys
1 5 10 15

gct ttt ggt aag gag ggt gat gcg ctg aag gat gtt gca aaa gtt gct 96
Ala Phe Gly Lys Glu Gly Asp Ala Leu Lys Asp Val Ala Lys Val Ala
20 25 30

gat gag aat ggg gat aac aag gat gcg ggg aag ttg ttt gct ggt gag 144
Asp Glu Asn Gly Asp Asn Lys Asp Ala Gly Lys Leu Phe Ala Gly Glu
35 40 45

aat ggt aat gct ggt ggt gct gct gat gct gac att gcg aag gcg gct 192
Asn Gly Asn Ala Gly Gly Ala Ala Asp Ala Asp Ile Ala Lys Ala Ala
50 55 60

gct gct gtt act gcg gtt agt ggg gag cag ata ctg aaa gct att gtt 240
Ala Ala Val Thr Ala Val Ser Gly Glu Gln Ile Leu Lys Ala Ile Val
65 70 75 80

gag gcg gct ggt gct gcg gat cag gcg ggt gta aag gct gag gag gct 288
Glu Ala Ala Gly Ala Ala Asp Gln Ala Gly Val Lys Ala Glu Glu Ala
85 90 95

aag aat ccg att gca gct gcg att ggg act gat gat gct ggt gcg gcg 336
Lys Asn Pro Ile Ala Ala Ala Ile Gly Thr Asp Asp Ala Gly Ala Ala
100 105 110

gag ttt ggt gag aat gat atg aag aag aat gat aat att gct gcg gct 384
Glu Phe Gly Glu Asn Asp Met Lys Lys Asn Asp Asn Ile Ala Ala Ala
115 120 125

att gtt ttg agg ggg gtg cct aag gat gga aag ttt gct gct aa 428
Ile Val Leu Arg Gly Val Pro Lys Asp Gly Lys Phe Ala Ala
130 135 140

<210> 12
<211> 142
<212> PRT
<213> Borrelia afzelii

<400> 12
Lys Gly Ile Ala Lys Gly Ile Lys Gly Ile Val Asp Ala Ala Gly Lys
1 5 10 15

Ala Phe Gly Lys Glu Gly Asp Ala Leu Lys Asp Val Ala Lys Val Ala
20 25 30

Asp Glu Asn Gly Asp Asn Lys Asp Ala Gly Lys Leu Phe Ala Gly Glu
35 40 45

Asn Gly Asn Ala Gly Gly Ala Ala Asp Ala Asp Ile Ala Lys Ala Ala
50 55 60

Ala Ala Val Thr Ala Val Ser Gly Glu Gln Ile Leu Lys Ala Ile Val

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 65                  70                  75                  80

Glu Ala Ala Gly Ala Ala Asp Gln Ala Gly Val Lys Ala Glu Glu Ala
                 85                  90                  95

Lys Asn Pro Ile Ala Ala Ala Ile Gly Thr Asp Asp Ala Gly Ala Ala
            100                 105                 110

Glu Phe Gly Glu Asn Asp Met Lys Lys Asn Asp Asn Ile Ala Ala Ala
        115                 120                 125

Ile Val Leu Arg Gly Val Pro Lys Asp Gly Lys Phe Ala Ala
    130                 135                 140
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<210> 13
<211> 426
<212> DNA
<213> Borrelia afzelii

<220>
<221> CDS
<222> (3)..(425)

<400> 13

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ag ggg att gcg aag ggg ata aag ggg att gtt gat gct gct ggg aag    47
   Gly Ile Ala Lys Gly Ile Lys Gly Ile Val Asp Ala Ala Gly Lys
     1               5                  10                  15

gct ttt ggc aag gag ggt agt gcg ctg aag gat gtt aaa aca gtt gct   95
Ala Phe Gly Lys Glu Gly Ser Ala Leu Lys Asp Val Lys Thr Val Ala
                 20                  25                  30

gct gag aat gag gct aac aag gat gcg ggg aag ttg ttt gct ggt aag   143
Ala Glu Asn Glu Ala Asn Lys Asp Ala Gly Lys Leu Phe Ala Gly Lys
             35                  40                  45

aat ggt aat gct gat gct gct gat gct gct gac att gcg aag gcg gct   191
Asn Gly Asn Ala Asp Ala Ala Asp Ala Ala Asp Ile Ala Lys Ala Ala
         50                  55                  60

ggt gct gtt agt gcg gtt agt ggg gag cag ata ctg aaa gct att gtt   239
Gly Ala Val Ser Ala Val Ser Gly Glu Gln Ile Leu Lys Ala Ile Val
     65                  70                  75

gat ggt gct ggt gat gca gct aat cag gcg ggt aaa aag gct gct gag   287
Asp Gly Ala Gly Asp Ala Ala Asn Gln Ala Gly Lys Lys Ala Ala Glu
 80                  85                  90                  95

gct aag aat ccg att gcg gct gcg att ggg act aat gaa gct ggg gcg   335
Ala Lys Asn Pro Ile Ala Ala Ala Ile Gly Thr Asn Glu Ala Gly Ala
                100                 105                 110

gag ttt ggt gat gat atg aag aag aga aat gat aag att gct gcg gct   383
Glu Phe Gly Asp Asp Met Lys Lys Arg Asn Asp Lys Ile Ala Ala Ala
            115                 120                 125
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att gtt ttg agg ggg gtg cct aag gat gga aag ttt gct gct a          426
Ile Val Leu Arg Gly Val Pro Lys Asp Gly Lys Phe Ala Ala
        130                 135                 140


<210> 14
<211> 141
<212> PRT
<213> Borrelia afzelii

<400> 14
Gly Ile Ala Lys Gly Ile Lys Gly Ile Val Asp Ala Ala Gly Lys Ala
  1               5                  10                  15

Phe Gly Lys Glu Gly Ser Ala Leu Lys Asp Val Lys Thr Val Ala Ala
             20                  25                  30

Glu Asn Glu Ala Asn Lys Asp Ala Gly Lys Leu Phe Ala Gly Lys Asn
         35                  40                  45

Gly Asn Ala Asp Ala Ala Asp Ala Ala Asp Ile Ala Lys Ala Ala Gly
     50                  55                  60

Ala Val Ser Ala Val Ser Gly Glu Gln Ile Leu Lys Ala Ile Val Asp
 65                  70                  75                  80

Gly Ala Gly Asp Ala Ala Asn Gln Ala Gly Lys Lys Ala Ala Glu Ala
                 85                  90                  95

Lys Asn Pro Ile Ala Ala Ala Ile Gly Thr Asn Glu Ala Gly Ala Glu
            100                 105                 110

Phe Gly Asp Asp Met Lys Lys Arg Asn Asp Lys Ile Ala Ala Ala Ile
        115                 120                 125

Val Leu Arg Gly Val Pro Lys Asp Gly Lys Phe Ala Ala
    130                 135                 140


<210> 15
<211> 5897
<212> DNA
<213> Borrelia garinii

<400> 15
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taattattta atactattca gcagtaaatt ctataagtca ttaattattt aatactattc 180
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ggtggtggcg ctagtgctgc aggtggcgct ggtgggattg agggcgctat aacagagatt 600
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<210> 16
<211> 396
<212> DNA
<213> Borrelia garinii

<220>
<221> CDS
<222> (2)..(394)

<400> 16

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  Gly Ile Lys Gly Ile Val Asp Ala Ala Glu Lys Ala Asp Ala Lys Glu
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ggg aag ttg aat gct gct ggt gct gag ggt acg act aac gcg gat gct   97
Gly Lys Leu Asn Ala Ala Gly Ala Glu Gly Thr Thr Asn Ala Asp Ala
             20                  25                  30

ggg aag ttg ttt gtg aag aat gct ggt aat gtg ggt ggt gaa gca ggt   145
Gly Lys Leu Phe Val Lys Asn Ala Gly Asn Val Gly Gly Glu Ala Gly
         35                  40                  45

gat gct ggg aag gct gct gct gcg gtt gct gct gtt agt ggg gag cag   193
```

```
Asp Ala Gly Lys Ala Ala Ala Ala Val Ala Ala Val Ser Gly Glu Gln
     50                  55                  60

ata tta aaa gcg att gtt gat gct gct aag gat ggt ggt gag aag cag   241
Ile Leu Lys Ala Ile Val Asp Ala Ala Lys Asp Gly Gly Glu Lys Gln
 65                  70                  75                  80

ggt aag aag gct gcg gat gct aca aat ccg att gag gcg gct att ggg   289
Gly Lys Lys Ala Ala Asp Ala Thr Asn Pro Ile Glu Ala Ala Ile Gly
                 85                  90                  95

ggt gcg ggt gat aat gat gct gct gcg gcg ttt gct act atg aag aag   337
Gly Ala Gly Asp Asn Asp Ala Ala Ala Ala Phe Ala Thr Met Lys Lys
            100                 105                 110

gat gat cag att gct gct gct atg gtt ctg agg gga atg gct aag gat   385
Asp Asp Gln Ile Ala Ala Ala Met Val Leu Arg Gly Met Ala Lys Asp
        115                 120                 125

ggg cag ttt gc                                                   396
Gly Gln Phe
    130


<210> 17
<211> 131
<212> PRT
<213> Borrelia garinii

<400> 17
Gly Ile Lys Gly Ile Val Asp Ala Ala Glu Lys Ala Asp Ala Lys Glu
  1               5                  10                  15

Gly Lys Leu Asn Ala Ala Gly Ala Glu Gly Thr Thr Asn Ala Asp Ala
             20                  25                  30

Gly Lys Leu Phe Val Lys Asn Ala Gly Asn Val Gly Gly Glu Ala Gly
         35                  40                  45

Asp Ala Gly Lys Ala Ala Ala Ala Val Ala Ala Val Ser Gly Glu Gln
     50                  55                  60

Ile Leu Lys Ala Ile Val Asp Ala Ala Lys Asp Gly Gly Glu Lys Gln
 65                  70                  75                  80

Gly Lys Lys Ala Ala Asp Ala Thr Asn Pro Ile Glu Ala Ala Ile Gly
                 85                  90                  95

Gly Ala Gly Asp Asn Asp Ala Ala Ala Ala Phe Ala Thr Met Lys Lys
            100                 105                 110

Asp Asp Gln Ile Ala Ala Ala Met Val Leu Arg Gly Met Ala Lys Asp
        115                 120                 125

Gly Gln Phe
    130
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<210> 18
<211> 390
<212> DNA
<213> Borrelia garinii

<220>
<221> CDS
<222> (2)..(388)

<400> 18
g ggg ata aag ggg att gtt gat gct gct gag aag gct gat gcg aag gaa 49
  Gly Ile Lys Gly Ile Val Asp Ala Ala Glu Lys Ala Asp Ala Lys Glu
    1   5   10   15

ggg aag ttg gat gtg gct ggt gat gct ggt gaa act aac aag gat gct   97
Gly Lys Leu Asp Val Ala Gly Asp Ala Gly Glu Thr Asn Lys Asp Ala
             20   25   30

ggg aag ttg ttt gtg aag aag aat aat gag ggt ggt gaa gca aat gat   145
Gly Lys Leu Phe Val Lys Lys Asn Asn Glu Gly Gly Glu Ala Asn Asp
         35   40   45

gct ggg aag gct gct gct gcg gtt gct gct gtt agt ggg gag cag ata   193
Ala Gly Lys Ala Ala Ala Ala Val Ala Ala Val Ser Gly Glu Gln Ile
     50   55   60

tta aaa gcg att gtt gat gct gct gag ggt ggt gag aag cag ggt aag   241
Leu Lys Ala Ile Val Asp Ala Ala Glu Gly Gly Glu Lys Gln Gly Lys
 65   70   75   80

aag gct gcg gat gct aca aat ccg att gag gcg gct att ggg ggt gcg   289
Lys Ala Ala Asp Ala Thr Asn Pro Ile Glu Ala Ala Ile Gly Gly Ala
                85   90   95

ggt gat aat gat gct gct gcg gcg ttt gct act atg aag aag gat gat   337
Gly Asp Asn Asp Ala Ala Ala Ala Phe Ala Thr Met Lys Lys Asp Asp
            100   105   110

cag att gct act gct atg gtt ctg agg gga atg gct aag gat ggg cag   385
Gln Ile Ala Thr Ala Met Val Leu Arg Gly Met Ala Lys Asp Gly Gln
        115   120   125

ttt gc   390
Phe

<210> 19
<211> 129
<212> PRT
<213> Borrelia garinii

<400> 19
Gly Ile Lys Gly Ile Val Asp Ala Ala Glu Lys Ala Asp Ala Lys Glu
  1   5   10   15

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Gly Lys Leu Asp Val Ala Gly Asp Ala Gly Glu Thr Asn Lys Asp Ala
            20                  25                  30

Gly Lys Leu Phe Val Lys Lys Asn Asn Glu Gly Gly Glu Ala Asn Asp
        35                  40                  45

Ala Gly Lys Ala Ala Ala Ala Val Ala Ala Val Ser Gly Glu Gln Ile
    50                  55                  60

Leu Lys Ala Ile Val Asp Ala Ala Glu Gly Gly Glu Lys Gln Gly Lys
65                  70                  75                  80

Lys Ala Ala Asp Ala Thr Asn Pro Ile Glu Ala Ala Ile Gly Gly Ala
                85                  90                  95

Gly Asp Asn Asp Ala Ala Ala Ala Phe Ala Thr Met Lys Lys Asp Asp
            100                 105                 110

Gln Ile Ala Thr Ala Met Val Leu Arg Gly Met Ala Lys Asp Gly Gln
        115                 120                 125

Phe
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<210> 20
<211> 390
<212> DNA
<213> Borrelia garinii

<220>
<221> CDS
<222> (2)..(388)

<400> 20

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g ggg ata aag ggg att gtt gat gct gct gag aag gct gat gcg aag gaa 49
  Gly Ile Lys Gly Ile Val Asp Ala Ala Glu Lys Ala Asp Ala Lys Glu
    1               5                  10                  15

ggg agg ttg gat gtg gct ggt gat gct ggt gaa act aac aag gat gct   97
Gly Arg Leu Asp Val Ala Gly Asp Ala Gly Glu Thr Asn Lys Asp Ala
            20                  25                  30

ggg aag ttg ttt gtg aag aag aat aat gag ggt ggt gaa gca aat gat   145
Gly Lys Leu Phe Val Lys Lys Asn Asn Glu Gly Gly Glu Ala Asn Asp
        35                  40                  45

gct ggg aag gct gct gct gcg gtt gct gct gtt agt ggg gag cag ata   193
Ala Gly Lys Ala Ala Ala Ala Val Ala Ala Val Ser Gly Glu Gln Ile
    50                  55                  60

tta aaa gcg att gtt gat gct gct gag ggt ggt gag aag cag ggt aag   241
Leu Lys Ala Ile Val Asp Ala Ala Glu Gly Gly Glu Lys Gln Gly Lys
65                  70                  75                  80

aag gct gcg gat gct aca aat ccg att gag gcg gct att ggg ggt gcg   289
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```
Lys Ala Ala Asp Ala Thr Asn Pro Ile Glu Ala Ala Ile Gly Gly Ala
                85                  90                  95

ggt gat aat gat gct gct gcg gcg ttt gct act atg aag aag gat gat   337
Gly Asp Asn Asp Ala Ala Ala Ala Phe Ala Thr Met Lys Lys Asp Asp
            100                 105                 110

cag att gct gct gct atg gtt ctg agg gga atg gct aag gat ggg cag   385
Gln Ile Ala Ala Ala Met Val Leu Arg Gly Met Ala Lys Asp Gly Gln
        115                 120                 125

ttt gc                                                            390
Phe


<210> 21
<211> 129
<212> PRT
<213> Borrelia garinii

<400> 21
Gly Ile Lys Gly Ile Val Asp Ala Ala Glu Lys Ala Asp Ala Lys Glu
  1               5                  10                  15

Gly Arg Leu Asp Val Ala Gly Asp Ala Gly Glu Thr Asn Lys Asp Ala
             20                  25                  30

Gly Lys Leu Phe Val Lys Lys Asn Asn Glu Gly Gly Glu Ala Asn Asp
         35                  40                  45

Ala Gly Lys Ala Ala Ala Ala Val Ala Ala Val Ser Gly Glu Gln Ile
     50                  55                  60

Leu Lys Ala Ile Val Asp Ala Ala Glu Gly Gly Glu Lys Gln Gly Lys
 65                  70                  75                  80

Lys Ala Ala Asp Ala Thr Asn Pro Ile Glu Ala Ala Ile Gly Gly Ala
                85                  90                  95

Gly Asp Asn Asp Ala Ala Ala Ala Phe Ala Thr Met Lys Lys Asp Asp
            100                 105                 110

Gln Ile Ala Ala Ala Met Val Leu Arg Gly Met Ala Lys Asp Gly Gln
        115                 120                 125

Phe



<210> 22
<211> 339
<212> DNA
<213> Borrelia garinii

<220>
<221> CDS
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<222> (2)..(337)

<400> 22

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g ggg ata aag ggg att gtt gat gct gct ggt gaa act aac aag gat gct 49
  Gly Ile Lys Gly Ile Val Asp Ala Ala Gly Glu Thr Asn Lys Asp Ala
    1               5                  10                  15

ggg aag ttg ttt gtg aag aag aat aat gag ggt ggt gaa gca aat gat   97
Gly Lys Leu Phe Val Lys Lys Asn Asn Glu Gly Gly Glu Ala Asn Asp
            20                  25                  30

gct ggg aag gct gct gct gcg gtt gct gct gtt agt ggg gag cag ata   145
Ala Gly Lys Ala Ala Ala Ala Val Ala Ala Val Ser Gly Glu Gln Ile
         35                  40                  45

tta aaa gcg att gtt gat gct gct gag ggt ggt gag aag cag ggt aag   193
Leu Lys Ala Ile Val Asp Ala Ala Glu Gly Gly Glu Lys Gln Gly Lys
     50                  55                  60

aag gct gcg gat gct aca aat ccg att gag gcg gct att ggg ggt aca   241
Lys Ala Ala Asp Ala Thr Asn Pro Ile Glu Ala Ala Ile Gly Gly Thr
 65                  70                  75                  80

aat gat aat gat gct gcg gcg ttt gct act atg aag aag gat gat cag   289
Asn Asp Asn Asp Ala Ala Ala Phe Ala Thr Met Lys Lys Asp Asp Gln
                85                  90                  95

att gct gct gct atg gtt ctg agg gga atg gct aag gat ggg cag ttt   337
Ile Ala Ala Ala Met Val Leu Arg Gly Met Ala Lys Asp Gly Gln Phe
            100                 105                 110

gc                                                               339
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<210> 23
<211> 112
<212> PRT
<213> Borrelia garinii

<400> 23

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Gly Ile Lys Gly Ile Val Asp Ala Ala Gly Glu Thr Asn Lys Asp Ala
  1               5                  10                  15

Gly Lys Leu Phe Val Lys Lys Asn Asn Glu Gly Gly Glu Ala Asn Asp
            20                  25                  30

Ala Gly Lys Ala Ala Ala Ala Val Ala Ala Val Ser Gly Glu Gln Ile
         35                  40                  45

Leu Lys Ala Ile Val Asp Ala Ala Glu Gly Gly Glu Lys Gln Gly Lys
     50                  55                  60

Lys Ala Ala Asp Ala Thr Asn Pro Ile Glu Ala Ala Ile Gly Gly Thr
 65                  70                  75                  80

Asn Asp Asn Asp Ala Ala Ala Phe Ala Thr Met Lys Lys Asp Asp Gln
                85                  90                  95
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Ile Ala Ala Ala Met Val Leu Arg Gly Met Ala Lys Asp Gly Gln Phe
100 105 110

<210> 24
<211> 21
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Synthetic Primer

<400> 24
ccagcaaaca acttccccgc c 21

<210> 25
<211> 24
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Synthetic Primer

<400> 25
atccttaaac tccgccccat catc 24

<210> 26
<211> 28
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Synthetic Primer

<400> 26
gagtgctgtg gagagtgctg ttgatgag 28

<210> 27
<211> 27
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Synthetic Primer

<400> 27
ggggataaag gggattgttg atgctgc 27

<210> 28
<211> 26
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Synthetic Primer

<400> 28
gcaaactgcc catccttagc cattcc 26

<210> 29
<211> 25
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Synthetic Primer

<400> 29
aaggggattg cgaaggggat aaagg 25

<210> 30
<211> 27
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Synthetic Primer

<400> 30
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<210> 31
<211> 5897
<212> DNA
<213> Borrelia garinii

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<210> 32
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<213> Borrelia garinii

<400> 32

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Ile Gln Leu Gly Asn Gly Phe Leu Asp Val Phe Thr Ser Phe Gly Gly
             20                  25                  30

Leu Val Ala Asp Ala Leu Gly Phe Lys Ala Asp Pro Lys Lys Ser Asp
         35                  40                  45

Val Lys Thr Tyr Phe Glu Ser Leu Ala Lys Lys Leu Glu Glu Thr Lys
     50                  55                  60

Asp Gly Leu Thr Lys Leu Ser Lys Gly Asn Asp Gly Asp Thr Gly Lys
 65                  70                  75                  80

Ala Gly Asp Ala Gly Gly Ala Gly Gly Gly Ala Ser Ala Ala Gly Gly
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Ala Gly Gly Ile
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<210> 33
<211> 34
<212> PRT
<213> Borrelia garinii

<400> 33
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Ser Leu Ala Lys Lys Leu Glu Glu Thr Lys Asp Gly Leu Thr Lys Leu
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Ser Lys

<210> 34
<211> 96
<212> PRT
<213> Borrelia garinii

<400> 34
Glu Gly Ala Ile Thr Glu Ile Ser Lys Trp Leu Asp Asp Met Ala Lys
1 5 10 15

Ala Ala Ala Glu Ala Ala Ser Ala Ala Thr Gly Asn Ala Ala Ile Gly
20 25 30

Asp Val Val Asn Gly Asn Gly Gly Ala Ala Lys Gly Gly Asp Ala Glu
35 40 45

Ser Val Asn Gly Ile Ala Lys Gly Ile Lys Gly Ile Val Asp Ala Ala
50 55 60

Glu Lys Ala Asp Ala Lys Glu Gly Lys Leu Asp Val Ala Gly Asp Ala
65 70 75 80

Gly Gly Ala Gly Gly Gly Ala Gly Ala Ala Gly Gly Ala Gly Gly Ile
85 90 95

<210> 35
<211> 198
<212> PRT
<213> Borrelia garinii

<400> 35
Glu Gly Ala Ile Thr Glu Ile Ser Lys Trp Leu Asp Asp Met Ala Lys
1 5 10 15

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Ala Ala Ala Val Ala Ala Ser Ala Ala Ser Ala Ala Thr Gly Asn Ala
             20                  25                  30

Ala Ile Gly Asp Val Val Asn Gly Asn Asp Gly Ala Ala Lys Gly Gly
         35                  40                  45

Asp Ala Ala Ser Val Asn Gly Ile Ala Lys Gly Ile Lys Gly Ile Val
     50                  55                  60

Asp Ala Ala Glu Lys Ala Asp Ala Lys Glu Gly Lys Leu Asp Val Ala
 65                  70                  75                  80

Gly Asp Ala Gly Glu Gly Asn Lys Asp Ala Gly Lys Leu Phe Val Lys
                 85                  90                  95

Lys Asn Ala Gly Asp Glu Gly Gly Glu Ala Asn Asp Ala Gly Lys Ala
            100                 105                 110

Ala Ala Ala Val Ala Ala Val Ser Gly Glu Gln Ile Leu Lys Ala Ile
        115                 120                 125

Val Asp Ala Ala Glu Gly Asp Asp Lys Gln Gly Lys Lys Ala Ala Asp
    130                 135                 140

Ala Thr Asn Pro Ile Glu Ala Ala Ile Gly Gly Ala Asp Ala Gly Ala
145                 150                 155                 160

Asn Ala Glu Ala Phe Asn Lys Met Lys Lys Asp Asp Gln Ile Ala Ala
                165                 170                 175

Ala Met Val Leu Arg Gly Met Ala Lys Asp Gly Gln Phe Ala Leu Lys
            180                 185                 190

Asp Asp Ala Ala Ala His
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<210> 36
<211> 191
<212> PRT
<213> Borrelia garinii

<400> 36

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Glu Gly Thr Val Lys Asn Ala Val Asp Met Ala Lys Ala Ala Ala Glu
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Ala Ala Ser Ala Ala Ser Ala Ala Thr Gly Ser Thr Thr Ile Gly Asp
             20                  25                  30

Val Val Lys Ser Gly Glu Ala Lys Asp Gly Asp Ala Ala Ser Val Asn
         35                  40                  45

Gly Ile Ala Lys Gly Ile Lys Gly Ile Val Asp Ala Ala Glu Lys Ala
     50                  55                  60

Asp Ala Lys Glu Gly Lys Leu Asp Val Ala Gly Ala Ala Gly Thr Thr
 65                  70                  75                  80
```

```
Asn Val Asn Val Gly Lys Leu Phe Val Lys Asn Asn Gly Asn Glu Gly
                 85                  90                  95

Gly Asp Ala Ser Asp Ala Gly Lys Ala Ala Ala Ala Val Ala Ala Val
            100                 105                 110

Ser Gly Glu Gln Ile Leu Lys Ala Ile Val Asp Ala Ala Lys Asp Gly
        115                 120                 125

Asp Lys Gln Gly Val Thr Asp Val Lys Asp Ala Thr Asn Pro Ile Glu
    130                 135                 140

Ala Ala Ile Gly Gly Thr Asn Asp Asn Asp Ala Ala Ala Phe Ala Thr
145                 150                 155                 160

Met Lys Lys Asp Asp Gln Ile Ala Ala Ala Met Val Leu Arg Gly Met
                165                 170                 175

Ala Lys Asp Gly Gln Phe Ala Leu Lys Asp Asp Ala Ala Lys Asp
            180                 185                 190
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<210> 37
<211> 63
<212> PRT
<213> Borrelia garinii

<400> 37

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Gly Asp Lys Thr Gly Val Ala Ala Asp Ala Glu Asn Pro Ile Asp Ala
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Ala Ile Gly Gly Ala Asp Ala Asp Ala Ala Ala Phe Asn Lys Glu Gly
             20                  25                  30

Met Lys Lys Asp Asp Gln Ile Ala Ala Ala Met Val Leu Arg Gly Met
         35                  40                  45

Ala Lys Asp Gly Gln Phe Ala Leu Thr Asn Asn Ala Ala Ala His
     50                  55                  60
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<210> 38
<211> 192
<212> PRT
<213> Borrelia garinii

<400> 38

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Glu Gly Thr Val Lys Asn Ala Val Asp Met Ala Lys Ala Ala Ala Val
  1               5                  10                  15

Ala Ala Ser Ala Ala Thr Gly Asn Ala Ala Ile Gly Asp Val Val Lys
             20                  25                  30

Ser Asn Gly Gly Ala Ala Ala Lys Gly Gly Asp Ala Ala Ser Val Asn
         35                  40                  45
```

```
Gly Ile Ala Lys Gly Ile Lys Gly Ile Val Asp Ala Ala Glu Lys Ala
     50                  55                  60

Asp Ala Lys Glu Gly Lys Leu Asp Val Ala Gly Ala Ala Gly Glu Thr
 65                  70                  75                  80

Asn Lys Asp Ala Gly Lys Leu Phe Val Lys Lys Asn Gly Asp Asp Gly
                 85                  90                  95

Gly Asp Ala Gly Asp Ala Gly Lys Ala Ala Ala Ala Val Ala Ala Val
            100                 105                 110

Ser Gly Glu Gln Ile Leu Lys Ala Ile Val Asp Ala Ala Lys Asp Gly
        115                 120                 125

Asp Lys Thr Gly Val Thr Asp Val Lys Asp Ala Thr Asn Pro Ile Asp
    130                 135                 140

Ala Ala Ile Gly Gly Ser Ala Asp Ala Asn Ala Glu Ala Phe Asp Lys
145                 150                 155                 160

Met Lys Lys Asp Asp Gln Ile Ala Ala Ala Met Val Leu Arg Gly Met
                165                 170                 175

Ala Lys Asp Gly Gln Phe Ala Leu Lys Asn Asn Asp His Asp Asn His
            180                 185                 190
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<210> 39
<211> 112
<212> PRT
<213> Borrelia garinii

<400> 39

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Lys Gly Thr Val Lys Asn Ala Val Asp Met Ala Lys Ala Ala Glu Glu
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Ala Ala Ser Ala Ala Ser Ala Ala Thr Gly Asn Ala Ala Ile Gly Asp
             20                  25                  30

Val Val Lys Asn Ser Gly Ala Ala Ala Lys Gly Gly Glu Ala Ala Ser
         35                  40                  45

Val Asn Gly Ile Ala Lys Gly Ile Lys Gly Ile Val Asp Ala Ala Gly
     50                  55                  60

Lys Ala Asp Ala Lys Glu Gly Lys Leu Asp Ala Thr Gly Ala Glu Gly
 65                  70                  75                  80

Thr Thr Asn Val Asn Ala Gly Lys Leu Phe Val Lys Arg Ala Ala Asp
                 85                  90                  95

Asp Gly Gly Asp Ala Asp Asp Ala Gly Lys Ala Ala Ala Ala Val Ala
            100                 105                 110
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<210> 40
<211> 174
<212> PRT
<213> Borrelia garinii

<400> 40
Ala Ser Ala Ala Thr Gly Asn Ala Ala Ile Gly Asp Val Val Asn Gly
1 5 10 15

Asp Val Ala Lys Ala Lys Gly Gly Asp Ala Ala Ser Val Asn Gly Ile
20 25 30

Ala Lys Gly Ile Lys Gly Ile Val Asp Ala Ala Glu Lys Ala Asp Ala
35 40 45

Lys Glu Gly Lys Leu Asn Ala Ala Gly Ala Glu Gly Thr Thr Asn Ala
50 55 60

Asp Ala Gly Lys Leu Phe Val Lys Asn Ala Gly Asn Val Gly Gly Glu
65 70 75 80

Ala Gly Asp Ala Gly Lys Ala Ala Ala Ala Val Ala Ala Val Ser Gly
85 90 95

Glu Gln Ile Leu Lys Ala Ile Val Asp Ala Ala Lys Asp Gly Gly Glu
100 105 110

Lys Gln Gly Lys Lys Ala Ala Asp Ala Thr Asn Pro Ile Asp Ala Ala
115 120 125

Ile Gly Gly Thr Asn Asp Asn Asp Ala Ala Ala Ala Phe Ala Thr Met
130 135 140

Lys Lys Asp Asp Gln Ile Ala Ala Ala Met Val Leu Arg Gly Met Ala
145 150 155 160

Lys Asp Gly Gln Phe Ala Leu Lys Asp Ala Ala Ala Ala His
165 170

<210> 41
<211> 195
<212> PRT
<213> Borrelia garinii

<400> 41
Glu Gly Thr Val Lys Asn Ala Val Asp Ile Ile Lys Ala Ala Ala Glu
1 5 10 15

Ala Ala Ser Ala Ala Ser Ala Ala Thr Gly Ser Ala Ala Ile Gly Asp
20 25 30

```
Val Val Asn Gly Asn Gly Ala Thr Ala Lys Gly Gly Asp Ala Lys Ser
         35                  40                  45

Val Asn Gly Ile Ala Lys Gly Ile Lys Gly Ile Val Asp Ala Ala Glu
     50                  55                  60

Lys Ala Asp Ala Lys Glu Gly Lys Leu Asp Val Ala Gly Asp Ala Gly
 65                  70                  75                  80

Glu Thr Asn Lys Asp Ala Gly Lys Leu Phe Val Lys Asn Asn Gly Asn
                 85                  90                  95

Glu Gly Gly Asp Ala Asp Asp Ala Gly Lys Ala Ala Ala Ala Val Ala
            100                 105                 110

Ala Val Ser Gly Glu Gln Ile Leu Lys Ala Ile Val Asp Ala Ala Lys
        115                 120                 125

Gly Gly Asp Lys Thr Gly Lys Asn Asn Val Lys Asp Ala Glu Asn Pro
    130                 135                 140

Ile Glu Ala Ala Ile Gly Ser Ser Ala Asp Ala Asp Ala Ala Ala Phe
145                 150                 155                 160

Asn Lys Glu Gly Met Lys Lys Asp Asp Gln Ile Ala Ala Ala Met Val
                165                 170                 175

Leu Arg Gly Met Ala Lys Asp Gly Gln Phe Ala Leu Thr Asn Asp Ala
            180                 185                 190

Ala Ala His
        195
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<210> 42
<211> 197
<212> PRT
<213> Borrelia garinii

<400> 42

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Glu Gly Thr Val Lys Asn Ala Val Gly Ser Ala Thr Asn Lys Thr Val
  1               5                  10                  15

Val Ala Leu Ala Asn Leu Val Arg Lys Thr Val Gln Ala Gly Leu Lys
             20                  25                  30

Lys Val Gly Asp Val Val Lys Asn Ser Glu Ala Lys Asp Gly Asp Ala
         35                  40                  45

Ala Ser Val Asn Gly Ile Ala Lys Gly Ile Lys Gly Ile Val Asp Ala
     50                  55                  60

Ala Glu Lys Ala Asp Ala Lys Glu Gly Lys Leu Asp Val Ala Gly Ala
 65                  70                  75                  80

Ala Gly Glu Thr Asn Lys Asp Ala Gly Lys Leu Phe Val Lys Lys Asn
                 85                  90                  95
```

```
Asn Glu Gly Gly Glu Ala Asn Asp Ala Gly Lys Ala Ala Ala Ala Val
            100                 105                 110

Ala Ala Val Ser Gly Glu Gln Ile Leu Lys Ala Ile Val Asp Ala Ala
        115                 120                 125

Lys Asp Gly Asp Asp Lys Gln Gly Lys Lys Ala Glu Asp Ala Thr Asn
    130                 135                 140

Pro Ile Asp Ala Ala Ile Gly Gly Ala Gly Ala Gly Ala Asn Ala Ala
145                 150                 155                 160

Ala Ala Phe Asn Asn Met Lys Lys Asp Asp Gln Ile Ala Ala Ala Met
                165                 170                 175

Val Leu Arg Gly Met Ala Lys Asp Gly Gln Phe Ala Leu Thr Asn Asn
            180                 185                 190

Ala His Thr Asn His
        195
```

<210> 43
<211> 198
<212> PRT
<213> Borrelia garinii

<400> 43

```
Lys Gly Thr Val Lys Asn Ala Val Asp Met Thr Lys Ala Ala Ala Val
  1               5                  10                  15

Ala Ala Ser Ala Ala Ser Ala Ala Thr Gly Asn Ala Ala Ile Gly Asp
             20                  25                  30

Val Val Asn Gly Asn Asp Gly Ala Ala Lys Gly Gly Asp Ala Ala Ser
         35                  40                  45

Val Asn Gly Ile Ala Lys Gly Ile Lys Gly Ile Val Asp Ala Ala Glu
     50                  55                  60

Lys Ala Asp Ala Lys Glu Gly Lys Leu Asn Val Ala Gly Ala Ala Gly
 65                  70                  75                  80

Ala Glu Gly Asn Glu Ala Ala Gly Lys Leu Phe Val Lys Lys Asn Ala
                 85                  90                  95

Gly Asp His Gly Gly Glu Ala Gly Asp Ala Gly Arg Ala Ala Ala Ala
            100                 105                 110

Val Ala Ala Val Ser Gly Glu Gln Ile Leu Lys Ala Ile Val Asp Ala
        115                 120                 125

Ala Lys Asp Gly Gly Asp Lys Gln Gly Lys Lys Ala Glu Asp Ala Glu
    130                 135                 140

Asn Pro Ile Asp Ala Ala Ile Gly Ser Thr Gly Ala Asp Asp Asn Ala
```

```
145                 150                 155                 160

Ala Glu Ala Phe Ala Thr Met Lys Lys Asp Asp Gln Ile Ala Ala Ala
                165                 170                 175

Met Val Leu Arg Gly Met Ala Lys Asp Gly Gln Phe Ala Leu Lys Asp
            180                 185                 190

Ala Ala His Asp Asn His
        195
```

<210> 44
<211> 86
<212> PRT
<213> Borrelia garinii

<400> 44

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Lys Gly Thr Val Lys Asn Ala Val Asp Ile Ile Lys Ala Thr Ala Val
  1               5                  10                  15

Ala Ala Ser Ala Ala Thr Gly Ser Thr Thr Ile Gly Asp Val Val Lys
             20                  25                  30

Asn Gly Glu Ala Lys Gly Gly Glu Ala Lys Ser Val Asn Gly Ile Ala
         35                  40                  45

Lys Gly Ile Lys Gly Ile Val Asp Ala Ala Gly Lys Ala Asp Ala Lys
     50                  55                  60

Glu Gly Lys Leu Asn Val Ala Gly Ala Ala Gly Glu Gly Asn Glu Ala
 65                  70                  75                  80

Ala Gly Lys Leu Phe Val
                85
```

<210> 45
<211> 71
<212> PRT
<213> Borrelia garinii

<400> 45

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Val Asn Tyr Tyr Arg Ile Arg Thr Ser Val Arg Tyr Glu Ser Phe Gly
  1               5                  10                  15

Tyr Phe Ala Ala Ala Asn Glu Phe Glu Ile Ser Glu Val Lys Ile Ala
             20                  25                  30

Asp Val Asn Gly Thr His Phe Ile Ala Thr Lys Glu Lys Glu Ile Leu
         35                  40                  45

Tyr Asp Ser Leu Asp Leu Arg Ala Arg Gly Lys Ile Phe Glu Ile Thr
     50                  55                  60

Ser Lys Arg Met Phe Lys Leu
 65                  70
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<210> 46
<211> 8762
<212> DNA
<213> Borrelia afzelii

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<210> 47
<211> 202
<212> PRT
<213> Borrelia afzelii

<400> 47

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Glu Ser Ala Val Asp Gly Val Ser Lys Trp Leu Glu Glu Met Ile Lys
  1               5                  10                  15

Ala Ala Lys Glu Ala Ala Thr Lys Gly Gly Thr Gly Gly Gly Ser Glu
             20                  25                  30

Lys Ile Gly Asp Val Gly Ala Ala Asn Asn Gln Gly Ala Val Ala Asp
         35                  40                  45
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```
Lys Asp Ser Val Lys Gly Ile Ala Lys Gly Ile Lys Gly Ile Val Asp
     50                  55                  60

Ala Ala Gly Lys Ala Phe Gly Lys Asp Gly Asn Ala Leu Thr Gly Val
 65                  70                  75                  80

Lys Glu Val Ala Asp Glu Ala Gly Ala Asn Glu Asp Ala Gly Lys Leu
                 85                  90                  95

Phe Ala Gly Asn Ala Gly Asn Ala Ala Ala Ala Asp Ile Ala Lys Ala
            100                 105                 110

Ala Gly Ala Val Thr Ala Val Ser Gly Glu Gln Ile Leu Lys Ala Ile
        115                 120                 125

Val Asp Gly Ala Gly Gly Ala Ala Gln Asp Gly Lys Lys Ala Ala Glu
    130                 135                 140

Ala Lys Asn Pro Ile Ala Ala Ala Ile Gly Ala Asp Ala Ala Gly Ala
145                 150                 155                 160

Asp Phe Gly Asp Asp Met Lys Lys Ser Asp Lys Ile Ala Ala Ala Ile
                165                 170                 175

Val Leu Arg Gly Val Ala Lys Ser Gly Lys Phe Ala Val Ala Asn Ala
            180                 185                 190

Ala Lys Lys Glu Ser Val Lys Ser Ala Val
        195                 200
```

<210> 48
<211> 207
<212> PRT
<213> Borrelia afzelii

<400> 48

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Glu Ser Ala Val Asp Glu Val Ser Lys Trp Leu Glu Glu Met Ile Lys
  1               5                  10                  15

Ala Ala Gly Gly Ala Ala Lys Gly Gly Thr Gly Gly Asn Asn Glu Lys
             20                  25                  30

Ile Gly Asp Ser Asp Asn Asn Lys Gly Ala Val Ala Asp Lys Asp Ser
         35                  40                  45

Val Lys Gly Ile Ala Lys Gly Ile Lys Gly Ile Val Asp Ala Ala Gly
     50                  55                  60

Lys Ala Phe Gly Lys Asp Gly Asn Ala Leu Lys Asp Val Ala Lys Val
 65                  70                  75                  80

Ala Asp Asp Ala Ala Gly Ala Asn Ala Asn Ala Gly Lys Leu Phe Ala
                 85                  90                  95

Gly Asn Ala Ala Gly Gly Ala Ala Asp Ala Asp Asp Ala Asn Ile Ala
```

```
            100                 105                 110

Lys Ala Ala Gly Ala Val Ser Ala Val Ser Gly Glu Gln Ile Leu Lys
        115                 120                 125

Ala Ile Val Asp Ala Ala Gly Ala Ala Ala Asn Gln Asp Gly Lys Lys
    130                 135                 140

Ala Ala Asp Ala Lys Asn Pro Ile Ala Ala Ala Ile Gly Thr Asn Asp
145                 150                 155                 160

Asp Gly Ala Glu Phe Lys Asp Gly Met Lys Lys Ser Asp Asn Ile Ala
                165                 170                 175

Ala Ala Ile Val Leu Arg Gly Val Ala Lys Gly Gly Lys Phe Ala Val
            180                 185                 190

Ala Asn Ala Ala Asn Asp Ser Lys Ala Ser Val Lys Ser Ala Val
        195                 200                 205


<210> 49
<211> 210
<212> PRT
<213> Borrelia afzelii

<400> 49
Glu Ser Ala Val Asp Glu Val Ser Lys Trp Leu Glu Glu Met Ile Thr
  1               5                  10                  15

Ala Ala Asp Gly Ala Ala Lys Gly Gly Thr Gly Gly Asn Ser Glu Lys
             20                  25                  30

Ile Gly Asp Ala Gly Asp Asn Asn Asn Gly Ala Val Ala Asp Glu Asn
         35                  40                  45

Ser Val Lys Glu Ile Ala Lys Gly Ile Lys Gly Ile Val Ala Ala Ala
     50                  55                  60

Gly Lys Ala Phe Gly Lys Asp Gly Lys Asp Gly Asp Ala Leu Lys Asp
 65                  70                  75                  80

Val Glu Thr Val Ala Ala Glu Asn Glu Ala Asn Lys Asp Ala Gly Lys
                 85                  90                  95

Leu Phe Ala Gly Ala Asn Gly Asn Ala Gly Ala Ala Val Gly Asp Ile
            100                 105                 110

Ala Lys Ala Ala Ala Ala Val Thr Ala Val Ser Gly Glu Gln Ile Leu
        115                 120                 125

Lys Ala Ile Val Asp Ala Ala Gly Asp Ala Asp Gln Ala Gly Lys Lys
    130                 135                 140

Ala Ala Glu Ala Lys Asn Pro Ile Ala Ala Ala Ile Gly Ala Asn Ala
145                 150                 155                 160
```

```
Ala Asp Asn Ala Ala Ala Phe Gly Lys Asp Glu Met Lys Lys Ser Asp
                165                 170                 175

Lys Ile Ala Ala Ala Ile Val Leu Arg Gly Val Ala Lys Asp Gly Lys
            180                 185                 190

Phe Ala Val Ala Asn Ala Asn Asp Asp Lys Lys Ala Ser Val Lys Ser
        195                 200                 205

Ala Val
    210
```

<210> 50
<211> 206
<212> PRT
<213> Borrelia afzelii

<400> 50

```
Glu Ser Ala Val Asp Glu Val Ser Lys Trp Leu Glu Glu Met Ile Thr
  1               5                  10                  15

Ala Ala Gly Glu Ala Ala Thr Lys Gly Gly Asp Ala Gly Gly Gly Ala
             20                  25                  30

Asp Lys Ile Gly Asp Val Gly Ala Ala Asn Asn Gly Ala Val Ala Asp
         35                  40                  45

Ala Ser Ser Val Lys Glu Ile Ala Lys Gly Ile Lys Gly Ile Val Asp
     50                  55                  60

Ala Ala Gly Lys Ala Phe Gly Lys Asp Gly Asn Ala Leu Lys Asp Val
 65                  70                  75                  80

Ala Glu Val Ala Asp Asp Lys Lys Glu Ala Gly Lys Leu Phe Ala Gly
                85                  90                  95

Asn Ala Gly Gly Ala Val Ala Asp Ala Ala Ala Ile Gly Lys Ala Ala
            100                 105                 110

Gly Ala Val Thr Ala Val Ser Gly Glu Gln Ile Leu Lys Ala Ile Val
        115                 120                 125

Asp Ala Ala Gly Gly Ala Asp Gln Ala Gly Lys Lys Ala Asp Ala Ala
    130                 135                 140

Lys Asn Pro Ile Ala Ala Ala Ile Gly Ala Asp Ala Ala Gly Ala Gly
145                 150                 155                 160

Ala Asp Phe Gly Asn Asp Met Lys Lys Arg Asn Asp Lys Ile Val Ala
                165                 170                 175

Ala Ile Val Leu Arg Gly Val Ala Lys Asp Gly Lys Phe Ala Ala Ala
            180                 185                 190

Ala Asn Asp Asp Asn Ser Lys Ala Ser Val Lys Ser Ala Val
        195                 200                 205
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<210> 51
<211> 204
<212> PRT
<213> Borrelia afzelii

<400> 51
Glu Ser Ala Val Asp Glu Val Ser Lys Trp Leu Glu Glu Met Ile Thr
1 5 10 15

Ala Ala Lys Glu Ala Ala Thr Lys Gly Gly Thr Gly Gly Asn Asn Glu
20 25 30

Lys Ile Gly Asp Ser Asp Ala Asn Asn Gly Ala Lys Ala Asp Ala Ser
35 40 45

Ser Val Asn Gly Ile Ala Asn Gly Ile Lys Gly Ile Val Asp Ala Ala
50 55 60

Gly Lys Ala Phe Gly Lys Glu Gly Ser Ala Leu Lys Asp Val Lys Thr
65 70 75 80

Val Ala Ala Glu Asn Glu Ala Asn Lys Asp Ala Gly Lys Leu Phe Ala
85 90 95

Gly Lys Asn Gly Asn Ala Asp Ala Ala Asp Ala Ala Asp Ile Ala Lys
100 105 110

Ala Ala Gly Ala Val Ser Ala Val Ser Gly Glu Gln Ile Leu Lys Ala
115 120 125

Ile Val Asp Gly Ala Gly Asp Ala Ala Asn Gln Ala Gly Lys Lys Ala
130 135 140

Ala Glu Ala Lys Asn Pro Ile Ala Ala Ala Ile Gly Thr Asn Glu Ala
145 150 155 160

Gly Ala Glu Phe Gly Asp Asp Met Lys Lys Arg Asn Asp Lys Ile Ala
165 170 175

Ala Ala Ile Val Leu Arg Gly Val Ala Lys Asp Gly Lys Phe Ala Val
180 185 190

Ala Asn Ala Ala Ala Asp Asn Ser Lys Ala Ser Val
195 200

<210> 52
<211> 203
<212> PRT
<213> Borrelia afzelii

<400> 52
Glu Ser Ala Val Asp Glu Val Ser Lys Trp Leu Glu Glu Met Ile Lys
1 5 10 15

Ala Ala Gly Glu Ala Ala Thr Lys Gly Gly Asp Ala Gly Gly Gly Ala

```
            20                  25                  30

Asp Lys Ile Gly Asp Ala Gly Asp Lys Gly Ala Val Ala Asp Ala Ser
         35                  40                  45

Ser Val Lys Glu Ile Ala Asn Gly Ile Lys Gly Ile Val Asp Ala Ala
     50                  55                  60

Gly Lys Ala Phe Gly Lys Glu Gly Ser Ala Leu Lys Asp Val Lys Thr
 65                  70                  75                  80

Val Ala Ala Glu Asn Glu Ala Asn Lys Asp Ala Gly Lys Leu Phe Ala
                 85                  90                  95

Gly Asn Ala Gly Asn Gly Ala Ala Asp Asp Ile Ala Lys Ala Ala Ala
            100                 105                 110

Ala Val Thr Ala Val Ser Gly Glu Gln Ile Leu Lys Ala Ile Val Asp
        115                 120                 125

Ala Ala Gly Asp Lys Ala Asn Gln Asp Gly Lys Lys Ala Ala Asp Ala
    130                 135                 140

Lys Asn Pro Ile Ala Ala Ala Ile Gly Ala Ala Asp Ala Gly Ala Ala
145                 150                 155                 160

Ala Ala Phe Asn Glu Asn Asp Met Lys Lys Ser Asp Lys Ile Ala Ala
                165                 170                 175

Ala Ile Val Leu Arg Gly Val Ala Lys Asp Gly Lys Phe Ala Ala Ala
            180                 185                 190

Asp Ala Asp Ala Asn Asn Ser Lys Ala Ser Val
        195                 200


<210> 53
<211> 200
<212> PRT
<213> Borrelia afzelii

<400> 53
Glu Ser Ala Val Gly Glu Val Ser Lys Trp Leu Glu Glu Met Ile Lys
  1               5                  10                  15

Ala Ala Gly Glu Ala Ala Lys Val Gly Gly Thr Gly Gly Ser Glu Lys
             20                  25                  30

Ile Gly Asp Ala Asp Asn Asn Lys Gly Ala Val Ala Asp Ala Ser Ser
         35                  40                  45

Val Asn Gly Ile Ala Asn Gly Ile Lys Gly Ile Val Asp Ala Ala Gly
     50                  55                  60

Lys Ala Phe Gly Lys Asp Gly Ala Leu Ala Gly Val Ala Ala Ala Ala
 65                  70                  75                  80
```

```
Glu Asn Asp Asp Lys Lys Asp Ala Gly Lys Leu Phe Ala Gly Lys Asn
                 85                  90                  95

Gly Gly Ala Gly Ala Ala Asp Ala Ile Gly Lys Ala Ala Ala Ala Val
            100                 105                 110

Thr Ala Val Ser Gly Glu Gln Ile Leu Lys Ala Ile Val Asp Ala Ala
        115                 120                 125

Gly Ala Ala Ala Asn Gln Ala Gly Lys Lys Ala Ala Asp Ala Lys Asn
    130                 135                 140

Pro Ile Ala Ala Ala Ile Gly Thr Ala Asp Asp Gly Ala Glu Phe Lys
145                 150                 155                 160

Asp Asp Met Lys Lys Ser Asp Asn Ile Ala Ala Ala Ile Val Leu Arg
                165                 170                 175

Gly Val Ala Lys Asp Gly Lys Phe Ala Val Ala Asn Ala Asp Asp Asn
            180                 185                 190

Lys Ala Ser Val Lys Ser Ala Val
        195                 200
```

<210> 54
<211> 197
<212> PRT
<213> Borrelia afzelii

<400> 54

```
Glu Ser Ala Val Asp Glu Val Ser Lys Trp Leu Glu Glu Met Ile Thr
  1               5                  10                  15

Ala Ala Gly Glu Ala Ala Lys Val Gly Ala Gly Gly Gly Ala Asp Lys
             20                  25                  30

Ile Gly Asp Ala Ala Asn Asn Gln Gly Ala Lys Ala Asp Glu Ser Ser
         35                  40                  45

Val Asn Gly Ile Ala Lys Gly Ile Lys Gly Ile Val Asp Ala Ala Gly
     50                  55                  60

Lys Ala Phe Gly Lys Glu Gly Ser Ala Leu Lys Asp Val Ala Lys Val
 65                  70                  75                  80

Ala Asp Asp Asp Asn Lys Asp Ala Gly Lys Leu Phe Ala Gly Asn Ala
                 85                  90                  95

Gly Gly Gly Ala Gly Ala Asp Ile Ala Lys Ala Ala Ala Ala Val Thr
            100                 105                 110

Ala Val Ser Gly Glu Gln Ile Leu Lys Ala Ile Val Asp Ala Ala Gly
        115                 120                 125

Ala Ala Asp Gln Ala Gly Ala Ala Ala Gly Ala Ala Lys Asn Pro Ile
    130                 135                 140
```

```
Ala Ala Ala Ile Gly Ala Asp Ala Gly Ala Ala Glu Glu Phe Lys Asp
145                 150                 155                 160

Glu Met Lys Lys Ser Asp Lys Ile Ala Ala Ala Ile Val Leu Arg Gly
                165                 170                 175

Val Ala Lys Gly Gly Lys Phe Ala Val Ala Ala Asn Asp Ala Ala Asn
            180                 185                 190

Val Lys Ser Ala Val
        195
```

<210> 55
<211> 199
<212> PRT
<213> Borrelia afzelii

<400> 55

```
Glu Ser Ala Val Gly Glu Val Ser Ala Trp Leu Glu Glu Met Ile Thr
  1               5                  10                  15

Ala Ala Ser Glu Ala Ala Thr Lys Gly Gly Thr Gly Gly Thr Gly Gly
             20                  25                  30

Asp Ser Glu Lys Ile Gly Asp Ser Asp Ala Asn Asn Gly Ala Val Ala
         35                  40                  45

Asp Ala Ser Ser Val Lys Glu Ile Ala Lys Gly Ile Lys Gly Ile Val
     50                  55                  60

Asp Ala Ala Gly Lys Ala Phe Gly Lys Asp Gly Asn Ala Leu Lys Asp
 65                  70                  75                  80

Val Ala Glu Val Ala Asp Asp Glu Ala Asn Ala Asp Ala Gly Lys Leu
                 85                  90                  95

Phe Ala Gly Asn Ala Gly Asn Ala Ala Ala Ala Asp Val Ala Lys Ala
            100                 105                 110

Ala Gly Ala Val Thr Ala Val Ser Gly Glu Gln Ile Leu Lys Ala Ile
        115                 120                 125

Val Asp Ala Ala Gly Ala Ala Asp Gln Ala Gly Ala Lys Ala Asp Ala
    130                 135                 140

Ala Lys Asn Pro Ile Ala Ala Ala Ile Gly Thr Asn Glu Ala Gly Ala
145                 150                 155                 160

Ala Phe Lys Asp Gly Met Lys Lys Arg Asn Asp Asn Ile Ala Ala Ala
                165                 170                 175

Ile Val Leu Arg Gly Val Ala Lys Ser Gly Lys Phe Ala Val Ala Ala
            180                 185                 190

Ala Asp Ala Gly Lys Ala Arg
```

195

<210> 56
<211> 207
<212> PRT
<213> Borrelia afzelii

<400> 56
Glu Ser Ala Val Asp Glu Val Ser Lys Trp Leu Glu Glu Met Ile Thr
1 5 10 15

Ala Ala Ser Glu Ala Ala Lys Val Gly Ala Gly Gly Asp Asp Lys Ile
20 25 30

Gly Asp Ser Ala Asn Asn Gly Ala Val Ala Asp Ala Gly Ser Val Lys
35 40 45

Gly Ile Ala Lys Gly Ile Lys Gly Ile Val Asp Ala Ala Gly Lys Ala
50 55 60

Phe Gly Lys Glu Gly Asp Ala Leu Lys Asp Val Ala Lys Val Ala Asp
65 70 75 80

Glu Asn Gly Asp Asn Lys Asp Ala Gly Lys Leu Phe Ala Gly Glu Asn
85 90 95

Gly Asn Ala Gly Gly Ala Ala Asp Ala Asp Ile Ala Lys Ala Ala Ala
100 105 110

Ala Val Thr Ala Val Ser Gly Glu Gln Ile Leu Lys Ala Ile Val Glu
115 120 125

Ala Ala Gly Ala Gly Asp Ala Ala Asn Gln Ala Gly Lys Lys Ala Asp
130 135 140

Glu Ala Lys Asn Pro Ile Ala Ala Ala Ile Gly Thr Asp Asp Ala Gly
145 150 155 160

Ala Ala Phe Gly Gln Asp Asp Met Lys Lys Arg Asn Asp Asn Ile Ala
165 170 175

Ala Ala Ile Val Leu Arg Gly Val Ala Lys Gly Gly Lys Phe Ala Val
180 185 190

Ala Asn Ala Ala Asn Asp Ser Lys Ala Ser Val Lys Ser Ala Val
195 200 205

<210> 57
<211> 153
<212> PRT
<213> Borrelia afzelii

<400> 57
Glu Ser Ala Val Asp Glu Val Ser Lys Trp Leu Glu Glu Ile Ile Thr
1 5 10 15

```
Ala Thr Gly Lys Ala Phe Gly Lys Asp Gly Asn Ala Leu Ala Gly Val
             20                  25                  30

Ala Lys Val Ala Asp Asp Glu Ala Asn Ala Asp Ala Gly Lys Leu Phe
         35                  40                  45

Ala Gly Glu Asn Gly Asn Ala Gly Ala Ala Ala Ile Gly Lys Ala Ala
     50                  55                  60

Ala Ala Val Thr Ala Val Ser Gly Glu Gln Ile Leu Lys Ala Ile Val
 65                  70                  75                  80

Asp Ala Ala Gly Gly Ala Ala Gln Val Gly Ala Gly Ala Gly Ala Ala
                 85                  90                  95

Thr Asn Pro Ile Ala Ala Ala Ile Gly Ala Ala Gly Asp Gly Ala Asp
            100                 105                 110

Phe Gly Lys Asp Glu Met Lys Lys Arg Asn Asp Lys Ile Ala Ala Ala
        115                 120                 125

Ile Val Leu Arg Gly Val Ala Lys Asp Gly Lys Phe Ala Ala Ala Ala
    130                 135                 140

Asn Asp Ser Lys Ala Ser Val Lys Ser
145                 150
```

<210> 58
<211> 202
<212> PRT
<213> Borrelia afzelii

<400> 58

```
Glu Ser Ala Val Asp Glu Val Ser Lys Trp Leu Glu Glu Met Ile Thr
  1               5                  10                  15

Ala Ala Asp Ala Ala Ala Ala Lys Val Gly Asp Ala Gly Gly Gly Ala
             20                  25                  30

Asp Lys Ile Gly Asp Val Gly Ala Ala Asn Lys Gly Ala Lys Ala Asp
         35                  40                  45

Ala Ser Ser Val Lys Glu Ile Ala Lys Gly Ile Lys Gly Ile Val Asp
     50                  55                  60

Ala Ala Gly Lys Ala Phe Gly Gly Asp Ala Leu Lys Asp Val Lys Ala
 65                  70                  75                  80

Ala Gly Asp Asp Asn Lys Glu Ala Gly Lys Leu Phe Ala Gly Ala Asn
                 85                  90                  95

Gly Asn Ala Gly Ala Asn Ala Ala Ala Ala Asp Asp Ile Ala Lys Ala
            100                 105                 110

Ala Gly Ala Val Ser Ala Val Ser Gly Glu Gln Ile Leu Lys Ala Ile
```

```
        115                 120                 125

Val Glu Ala Ala Gly Ala Ala Asp Gln Ala Gly Val Lys Ala Glu Glu
    130                 135                 140

Ala Lys Asn Pro Ile Ala Ala Ala Ile Gly Thr Asp Asp Ala Gly Ala
145                 150                 155                 160

Ala Glu Phe Gly Glu Asn Asp Met Lys Lys Asn Asp Asn Ile Ala Ala
                165                 170                 175

Ala Ile Val Leu Arg Gly Val Ala Lys Ser Gly Lys Phe Ala Ala Asn
            180                 185                 190

Ala Asn Asp Ala Gly Lys Lys Glu Ser Val
        195                 200
```

<210> 59
<211> 201
<212> PRT
<213> Borrelia afzelii

<400> 59

```
Lys Ser Ala Val Asp Glu Ala Ser Lys Trp Leu Glu Glu Met Ile Thr
  1               5                  10                  15

Ala Ala Gly Glu Ala Ala Thr Lys Gly Gly Thr Gly Glu Ala Ser Glu
             20                  25                  30

Lys Ile Gly Asp Val Gly Asp Asn Asn His Gly Ala Val Ala Asp Ala
         35                  40                  45

Asp Ser Val Lys Gly Ile Ala Lys Gly Ile Lys Gly Ile Val Asp Ala
     50                  55                  60

Ala Gly Lys Ala Phe Gly Lys Asp Gly Ala Leu Lys Asp Val Ala Ala
 65                  70                  75                  80

Ala Ala Gly Asp Glu Ala Asn Lys Asp Ala Gly Lys Leu Phe Ala Gly
                 85                  90                  95

Gln Asp Gly Gly Gly Ala Asp Gly Asp Ile Ala Lys Ala Ala Ala Ala
            100                 105                 110

Val Thr Ala Val Ser Gly Glu Gln Ile Leu Lys Ala Ile Val Glu Ala
        115                 120                 125

Ala Gly Asp Lys Ala Asn Gln Val Gly Val Lys Ala Ala Gly Ala Ala
    130                 135                 140

Thr Asn Pro Ile Ala Ala Ala Ile Gly Thr Asp Asp Asp Asn Ala Ala
145                 150                 155                 160

Ala Phe Asp Lys Asp Glu Met Lys Lys Ser Asn Asp Lys Ile Ala Ala
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<210> 60
<211> 82
<212> PRT
<213> Borrelia afzelii

<400> 60

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Ala Ala Ser Asp Ala Ala Thr Lys Gly Gly Thr Gly Glu Ala Ser Glu
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Lys Ile Gly Asp Ser Asp Ala Asn Lys Gly Ala Gly Ala Gly Ala Ala
         35                  40                  45

Phe Gly Glu Asn Asp Met Lys Lys Arg Asn Asp Asn Ile Ala Ala Ala
     50                  55                  60

Ile Val Leu Arg Gly Val Ala Lys Asp Gly Lys Phe Ala Val Lys Glu
 65                  70                  75                  80

Asp Tyr
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<210> 61
<211> 179
<212> PRT
<213> Borrelia afzelii

<400> 61

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His Lys Leu Ile Val Leu Val Ser Thr Leu Cys Tyr Ile Asn Asn Lys
             20                  25                  30

Asn Lys Lys Tyr Ser Gln Ser Asn Ile Leu Tyr Tyr Phe Asn Glu Asn
         35                  40                  45

Leu Lys Arg Asn Gly Gln Thr Pro Ile Lys Ile Lys Thr Leu Gln Asn
     50                  55                  60

Tyr Leu Tyr Lys Leu Glu Lys Glu Phe Glu Val Thr Thr Asn Tyr Tyr
 65                  70                  75                  80

Lys His Leu Gly Val Asn Cys Gly Thr Glu Ile Tyr Tyr Lys Leu Lys
                 85                  90                  95

Tyr Gln Lys Gln Lys Cys Tyr His Lys Ile Asn Gln Tyr Phe Lys Lys
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            100                 105                 110

Lys Lys Glu Ile Lys Phe Asn Leu Arg Val Ser Ala Phe Phe Asn Lys
        115                 120                 125

Lys His Ser Lys Lys Gly Ser Val Glu Leu Lys Glu Cys Asn Asn Asn
    130                 135                 140

Asn Asn Asn Lys Glu Lys Glu Thr Ser Gln Lys Ile Glu Ile Leu Gln
145                 150                 155                 160

Thr Lys Val Tyr Ala Lys Lys Cys Lys Phe Leu Thr Asn Tyr Tyr Thr
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Lys Ile Leu
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<210> 62
<211> 2775
<212> DNA
<213> Borrelia garinii

<400> 62
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<210> 63
<211> 2075
<212> DNA
<213> Borrelia garinii

<400> 63
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<210> 64
<211> 2775
<212> DNA
<213> Borrelia garinii

<400> 64
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<210> 65
<211> 2075
<212> DNA
<213> Borrelia garinii

<400> 65
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<210> 66
<211> 184
<212> PRT
<213> Borrelia garinii

<400> 66
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Ser Asn Gly Gly Ala Ala Ala Lys Gly Gly Asp Ala Ala Ser Val Asn
35 40 45

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Gly Ile Ala Lys Gly Ile Lys Gly Ile Val Asp Ala Ala Glu Lys Ala
     50                  55                  60

Asp Ala Lys Glu Gly Lys Leu Asp Val Ala Gly Ala Ala Gly Glu Thr
 65                  70                  75                  80

Asn Lys Asp Ala Gly Lys Leu Phe Val Lys Lys Asn Gly Asp Asp Gly
                 85                  90                  95

Gly Asp Ala Gly Asp Ala Gly Lys Ala Ala Ala Ala Val Ala Ala Val
            100                 105                 110

Ser Gly Glu Gln Ile Leu Lys Ala Ile Val Asp Ala Ala Lys Asp Gly
        115                 120                 125

Asp Lys Thr Gly Val Thr Asp Val Lys Asp Ala Thr Asn Pro Ile Asp
    130                 135                 140

Ala Ala Ile Gly Gly Ser Ala Asp Ala Asn Ala Glu Ala Phe Asp Lys
145                 150                 155                 160

Met Lys Lys Asp Asp Gln Ile Ala Ala Ala Met Val Leu Arg Gly Met
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Ala Lys Asp Gly Gln Phe Ala Leu
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<210> 67
<211> 140
<212> PRT
<213> Borrelia garinii

<400> 67

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             20                  25                  30

Lys Leu Phe Val Lys Asn Asn Gly Asn Glu Gly Gly Asp Ala Asp Asp
         35                  40                  45

Ala Gly Lys Ala Ala Ala Ala Val Ala Ala Val Ser Gly Glu Gln Ile
     50                  55                  60

Leu Lys Ala Ile Val Asp Ala Ala Lys Gly Gly Asp Lys Thr Gly Lys
 65                  70                  75                  80

Asn Asn Val Lys Asp Ala Glu Asn Pro Ile Glu Ala Ala Ile Gly Ser
                 85                  90                  95

Ser Ala Asp Ala Asp Ala Ala Ala Phe Asn Lys Glu Gly Met Lys Lys
            100                 105                 110

Asp Asp Gln Ile Ala Ala Ala Met Val Leu Arg Gly Met Ala Lys Asp
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        115                 120                 125

Gly Gln Phe Ala Leu Thr Asn Asp Ala Ala Ala His
    130                 135                 140
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<210> 68
<211> 942
<212> DNA
<213> Borrelia garinii

<400> 68

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<210> 69
<211> 217
<212> PRT
<213> Borrelia garinii

<400> 69

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Met Arg Gly Ser His His His His His His Gly Ser Lys Gly Thr Val
  1               5                  10                  15

Lys Asn Ala Val Asp Met Thr Lys Ala Ala Ala Val Ala Ala Ser Ala
             20                  25                  30

Ala Ser Ala Ala Thr Gly Asn Ala Ala Ile Gly Asp Val Val Asn Gly
         35                  40                  45

Asn Asp Gly Ala Ala Lys Gly Gly Asp Ala Ala Ser Val Asn Gly Ile
     50                  55                  60

Ala Lys Gly Ile Lys Gly Ile Val Asp Ala Ala Glu Lys Ala Asp Ala
 65                  70                  75                  80

Lys Glu Gly Lys Leu Asn Val Ala Gly Ala Ala Gly Ala Glu Gly Asn
                 85                  90                  95

Glu Ala Ala Gly Lys Leu Phe Val Lys Lys Asn Ala Gly Asp His Gly
            100                 105                 110
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Gly Glu Ala Gly Asp Ala Gly Arg Ala Ala Ala Ala Val Ala Ala Val
        115                 120                 125

Ser Gly Glu Gln Ile Leu Lys Ala Ile Val Asp Ala Ala Lys Asp Gly
    130                 135                 140

Gly Asp Lys Gln Gly Lys Lys Ala Glu Asp Ala Glu Asn Pro Ile Asp
145                 150                 155                 160

Ala Ala Ile Gly Ser Thr Gly Ala Asp Asp Asn Ala Ala Glu Ala Phe
                165                 170                 175

Ala Thr Met Lys Lys Asp Asp Gln Ile Ala Ala Ala Met Val Leu Arg
            180                 185                 190

Gly Met Ala Lys Asp Gly Gln Phe Ala Leu Lys Asp Ala Ala His Asp
        195                 200                 205

Asn His Leu Gln Pro Ser Leu Ile Ser
    210                 215
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<210> 70
<211> 663
<212> DNA
<213> Borrelia afzelii

<400> 70
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gaagctagcg aaaagattgg ggatgttggt gataataatc atggtgctgt agctgatgcg 180
gacagtgtta aggggattgc gaaggggata aaggggattg ttgatgctgc tgggaaggct 240
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gatgcgggga agttgtttgc tggtcaggat ggtggtggtg ctgatggtga cattgcgaag 360
gcggctgctg ctgttactgc ggttagtggg gagcagatac tgaaagctat tgttgaggct 420
gctggtgata aggctaatca ggtgggtgta aaggctgctg gtgcggctac gaatccgatt 480
gcagctgcga ttgggactga tgatgataat gcggcggcgt ttgataagga tgagatgaag 540
aagagtaatg ataagattgc tgcggctatt gttttgaggg gggtggctaa ggatggaaag 600
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tga 663

<210> 71
<211> 220
<212> PRT
<213> Borrelia afzelii

<400> 71
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Met Arg Gly Ser His His His His His His Gly Ser Lys Ser Ala Val
  1               5                  10                  15

Asp Glu Ala Ser Lys Trp Leu Glu Glu Met Ile Thr Ala Ala Gly Glu
             20                  25                  30

Ala Ala Thr Lys Gly Gly Thr Gly Glu Ala Ser Glu Lys Ile Gly Asp
         35                  40                  45
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```
Val Gly Asp Asn Asn His Gly Ala Val Ala Asp Ala Asp Ser Val Lys
     50                  55                  60

Gly Ile Ala Lys Gly Ile Lys Gly Ile Val Asp Ala Ala Gly Lys Ala
 65                  70                  75                  80

Phe Gly Lys Asp Gly Ala Leu Lys Asp Val Ala Ala Ala Ala Gly Asp
                 85                  90                  95

Glu Ala Asn Lys Asp Ala Gly Lys Leu Phe Ala Gly Gln Asp Gly Gly
            100                 105                 110

Gly Ala Asp Gly Asp Ile Ala Lys Ala Ala Ala Ala Val Thr Ala Val
        115                 120                 125

Ser Gly Glu Gln Ile Leu Lys Ala Ile Val Glu Ala Ala Gly Asp Lys
    130                 135                 140

Ala Asn Gln Val Gly Val Lys Ala Ala Gly Ala Ala Thr Asn Pro Ile
145                 150                 155                 160

Ala Ala Ala Ile Gly Thr Asp Asp Asp Asn Ala Ala Ala Phe Asp Lys
                165                 170                 175

Asp Glu Met Lys Lys Ser Asn Asp Lys Ile Ala Ala Ala Ile Val Leu
            180                 185                 190

Arg Gly Val Ala Lys Asp Gly Lys Phe Ala Ala Asn Ala Asn Asp Asn
        195                 200                 205

Ser Lys Ala Ser Val Leu Gln Pro Ser Leu Ile Ser
    210                 215                 220
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<210> 72
<211> 26
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Synthetic Primer

<400> 72
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<210> 73
<211> 29
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Synthetic Primer

<400> 73

cgggatccga gagtgctgtt gatgaggtt 29

<210> 74
<211> 35
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Synthetic Primer

<400> 74
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<210> 75
<211> 35
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Synthetic Primer

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<210> 76
<211> 26
<212> DNA
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<223> Description of Artificial Sequence: Synthetic Primer

<400> 76
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<210> 77
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<210> 78
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<212> DNA
<213> Artificial Sequence

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Primer

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<210> 79
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Primer

<400> 79
ttctgcagat gattatcatg agcagcatcc ttca 34

<210> 80
<211> 17
<212> DNA
<213> Borrelia burgdorferi

<400> 80
tgaggggct attaagg 17

<210> 81
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<212> DNA
<213> Artificial Sequence

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Primer

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ccggaattcc gg 12